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ABSTRACT

This paper reports on a study of visual acuity among radiologists. Twenty-eight radiologists had their visual acuity tested by an optometrist. One week later, 70 medical school faculty radiologists were asked to respond to a printed questionnaire that elicited information about: (1) the date of the respondent's immediately previous examination; (2) wearing of corrective lenses for various activities; (3) opinions about requiring vision examinations for radiologists; and (4) the importance of the issue of visual acuity to radiologists. The examination revealed that 23 of the 28 radiologists had the equivalent of 20/20 acuity. Five had acuity equivalent to 20/25, three of these with corrective lenses and two without. Forty-three radiologists responded to the questionnaire. Of these, 67% had their vision examined within the past 2 years, 19% had not had their vision checked within the past 3 years, and 9% had not had their vision examined within the past 5 years. Eighty-four percent wore corrective lenses sometimes or always for film reading. Fifty-six percent of the radiologists believed that periodic testing of visual acuity should be required in the profession; 37% thought it should be optional; 7% thought it should not be required. Forty-one of the 43 believed that periodic visual acuity testing was very important or somewhat important. (Contains 15 references.) (KRN)

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Visual Acuity of Radiologists: The Important but Forgotten Component of the Radiological Process

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by
Barbara C. Good

If there were a metaphor profession for visual literacy, it would most certainly be radiology. Not only is vision of the utmost importance in this medical specialty, but the exercise of diagnostic abilities when one attempts to decipher any type of radiographic image bespeaks "literacy" in a very special language: radiological interpretation. Indeed, when a radiologist talks about his day-to-day activity, he speaks about *reading* an image, he talks about going to the *reading* room, he asks how many films he has to *read* that day.

From the time that Wilhelm Roentgen discovered the x-ray in 1895, numerous articles have been written about many of the different perceptual and interpretive problems that are involved in the diagnosis of radiological images. Image quality has been examined in terms of contrast, brightness, resolution, magnification and minification, edge enhancement, and reversal (i.e., positive vs negative), to name a few concerns (see, e.g., 1-5). Readers themselves have been looked at in terms of their rates of diagnostic accuracy and the contributions they make to the effective treatment of patients within the medical system (6,7). Studies on the observer have focused on such variables as the visual search, search/viewing time, viewing distance, years of experience, and even the effects of alcohol (8-12). Issues of ergonomics in radiology, that is, the different technologies and their configurations that may contribute to an improvement in the relationship between the radiologist and his working environment and thus make the interpretive process easier, more comfortable, and potentially more accurate, have also been studied in recent years (see, e.g., 13). Such environmental factors as increased or decreased room lighting levels, quiet vs noise, chair type, room temperature, and so forth, have been examined by both academic researchers and commercial entities in efforts to arrive at the "ideal" reading environment. In short, the radiologist has been looked at from almost every angle in the attempt to understand the different components of the reading process.

Strangely, the one aspect of the radiological interpretive process that has been generally overlooked is visual acuity itself. Attempting to decipher the reasons for this would only be speculating. Suffice it to say that a

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search of the medical literature the author performed showed that in the past five years only *one* scientific article has addressed the issue of visual acuity in radiologists (14). Because this issue may be of central importance in the practice of radiology, the study described here was carried out. This paper addresses several of the issues raised and data discussed in a commentary the author and two of her co-workers published in 1991 in the *American Journal of Roentgenology* (15).

METHODS

Two data-gathering tools were used in this study: 1) an optometrist-administered eye examination and 2) a short printed survey that asked questions about radiologists' personal visual acuity habits and opinions about the perceived importance of the topic under investigation.

Visual acuity testing. Twenty-eight radiologists (six women, 22 men; ages 30-70) in the Department of Diagnostic Radiology at the University of Pittsburgh Medical Center agreed to have their visual acuity tested by an in-house optometrist. All visual examinations were completed over a period of one week. Distant and near vision were measured (corrected and/or uncorrected without refraction for both eyes) using the standard Snellen and Jaeger eye chart.

Radiology survey. One week later, the 70 faculty radiologists in the Department of Diagnostic Radiology, including those who underwent the acuity examination, were requested to provide answers to a short printed questionnaire. Items examined included: 1) date of the responding individual's immediately previous examination of vision (excluding the experiment reported here); 2) wearing of corrective lenses for various activities; 3) opinions about whether periodic vision examinations should be required for radiologists; and 4) perceived level of importance of the issue of visual acuity to radiologists.

RESULTS

Because it is near vision that radiologists employ when they read an image, only those results from the near visual examination are reported here (Table 1). Examination of the 28 radiologists who participated in this part of the study revealed that 23 of them (82%) had the equivalent of 20/20 vision with or without corrective lenses. Five of the 28 (18%) had less than 20/20 acuity (equivalent to 20/25), three of these with corrective lenses and two without correction. Twenty-three of the 28 wore corrective lenses on a regular basis.

Forty-three radiologists responded to our printed questionnaire. Findings revealed that 29 (67%) of these radiologists had had their vision examined within the past *two* years. Eight (19%) had *not* had their vision checked within the past *three* years, and four (9%) had not had their vision examined within the past *five* years. Thirty-six of the 43 (84%) wore corrective lenses "sometimes" or "always" for film reading. More than half, 26 of the 43, wore corrective lenses "always" for reading film or books.

TABLE 1
Results of near-vision visual acuity testing (N = 28)

Radiologists in whom vision was	Near vision = to 20/20	Near vision = to 20/25
Corrected only	19	3
Uncorrected only	2	2
Corrected and uncorrected	2	-
Totals	23	5

The results of our questionnaire also indicated that 24 of the 43 (56%) radiologists believed that periodic testing of visual acuity should be required in the profession; 16 (37%) thought it should be optional. Only three (7%) felt it should not be required.

Forty-one of the 43 radiologists who responded to the survey believed that the issue of periodic visual acuity testing for radiologists was "very" (19/43) or "somewhat" (22/43) important.

DISCUSSION

From the results of the visual examination, only a minority of those tested (5/27) were recommended for minimal visual correction. However, it should be noted that self selection may have biased these generally good results, since the study was carried out on a voluntary basis and less than one-half of our faculty actually participated. It is likely that those who felt less confident about the excellence of their own visual acuity were those who elected to avoid the examination, and had the examination been a required one, it is possible that more serious visual defects or deterioration would have been discovered.

Should periodic visual acuity tests be required for radiologists--perhaps as a condition for licensure, staff privileges, or malpractice insurance coverage? The idea makes sense to the author. Similar practices are mandatory for other non-medical occupations which rely on visual activity.

The deterioration of vision with age is a phenomenon that is widely acknowledged by both medical professionals and the general public. It is typically a slow and subtle process and could thus

potentially go undetected for significant periods. Because of the central role that vision plays in the conduct of the day-to-day activities of radiology, it, of all professions, should be aware of the dangers that may lie in overlooking or undervaluing visual acuity as a component of the interpretive, or "reading," process. Of all the components of the radiological reading process, visual acuity is perhaps the most easily measured and corrected. The expense of regular vision examinations could be well worth the investment when weighed against the possible costs of allowing readers with possibly slowly deteriorating and uncorrected vision to continue to interpret radiological images. The training radiologists receive in how to think visually, how to construct three-dimensional images in the mind, how to arrive at a Gestalt of an image, and how to understand the visible signs of normalcy and disease that present in a radiograph all diminish in value if the eyes through which an image is seen are physiologically faulty.

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